Mapline

HISTORICAL BOUNDARY DATA FILE

JOHN H. LONG

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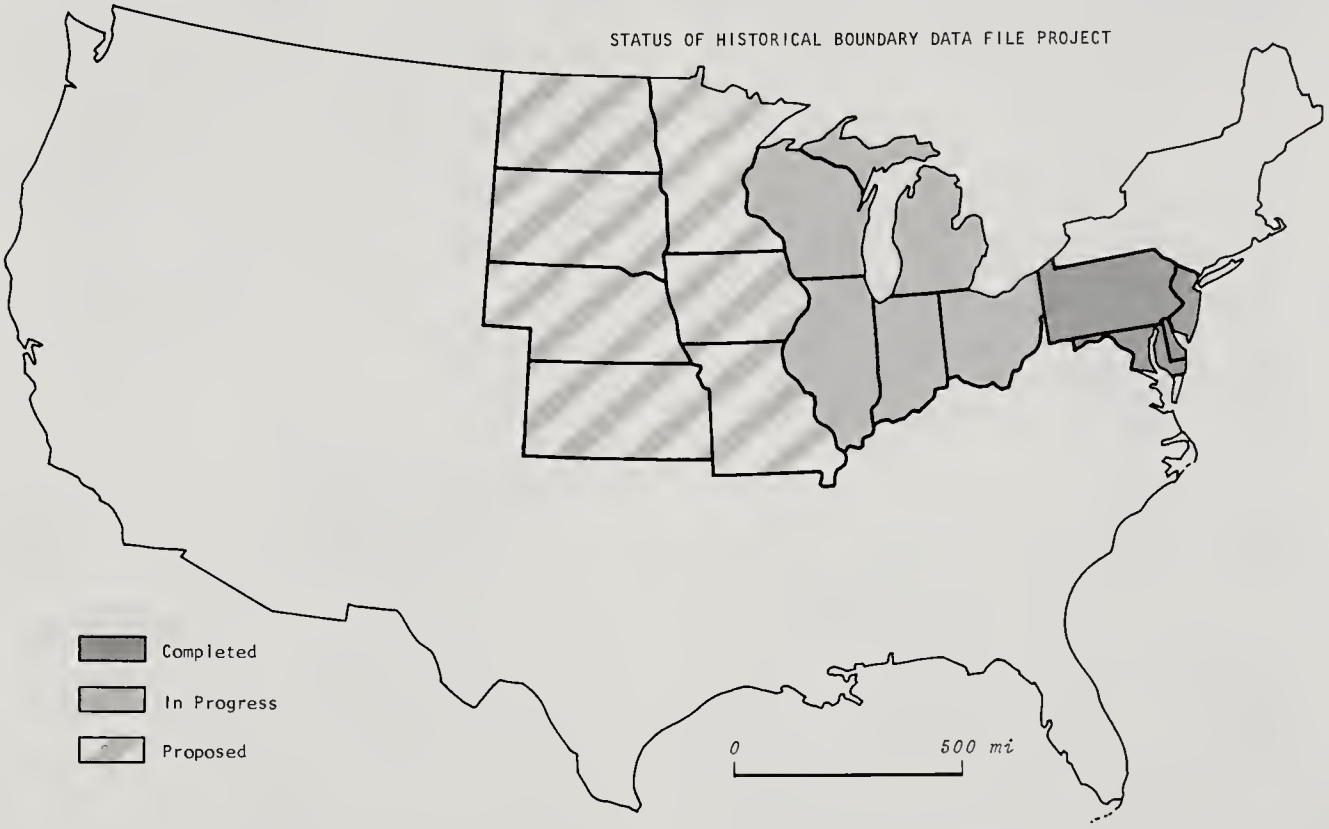

WHAT IS THE BOUNDARY PROJECT?

Employing an innovative combination of traditional historical research and computer cartography, scholars at the Newberry Library are mapping all the changes in the boundaries, seats of government, and relevant geographic names of the territories, states, and counties of the United States that have occurred since the organization of the first territory in 1788.

These projects are sponsored by
The Newberry Library
and have been supported in part
by grants from
THE NATIONAL ENDOWMENT FOR THE HUMANITIES

The Hermon Dunlap Smith Center for the History of Cartography

Director: **David Woodward**

The Center was founded in 1972 at The Newberry Library to promote the study of the history of cartography through research projects, fellowships, courses of instruction, and publications. Further information is available on request.

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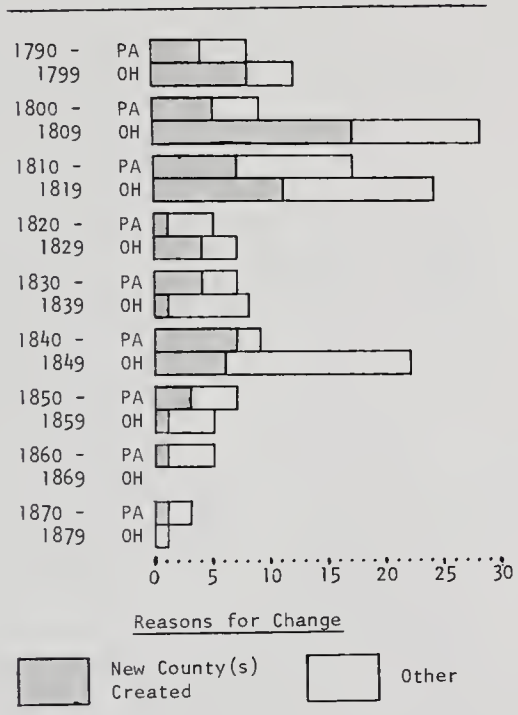
The first phase of the project, which concluded in September 1977, covered Delaware, Maryland, New Jersey, and Pennsylvania and clearly demonstrated the feasibility of employing modern computer science in the service of historical cartography. During the second phase of the project, currently in progress and scheduled to end in September 1979, the region under study is that of Illinois, Indiana, Michigan, Ohio, and Wisconsin, the states carved from the old Northwest Territory.

NUMBER OF TIMES STATE OR COUNTY

BOUNDARIES CHANGED

IN PENNSYLVANIA AND OHIO



IMPORTANCE OF BOUNDARIES

Boundaries are, of course, more than dashed lines crisscrossing the face of a map. Every nation in the world defines itself in part by the territory under its jurisdiction and nearly all organize themselves by geographic sub-units (e.g., states, counties, cities, etc.) to facilitate administration. Sometimes the geographic or territorial divisions are based upon population (e.g., boundaries drawn around densely settled areas or between regions inhabited by people who speak different languages), sometimes on easily recognizable natural features (e.g., boundaries defined by ridges, rivers, etc.), and sometimes the boundaries of those units are defined by such arbitrary and relatively artificial means as parallels of latitude or the range and township lines laid out in the United States by the rectangular land survey. Whatever the basis, each decision to divide and organize territory in a particular way--to draw a boundary here instead of there--affects the lives of everyone within the region and beyond.

By delimiting the area within its jurisdiction, the boundaries of a particular government explicitly determine which activities, industries, resources, and people are subject to its taxes and regulations and must look to it for protection and other services. Administratively, the boundaries of a county usually determine which people will be counted together in a census, will go to school together, and will vote together. Changing the boundaries of a county can apparently "move" people from one area to another and alter the composition of the electorate in a congressional or state electoral district. In the country that gave the world the Gerrymander, no historian, political scientist, sociologist, geographer, or economist can hope to comprehend the nation's economic, political, or social development at any level without knowledge and appreciation of past boundary changes.

Counties were chosen as the principal subject of the project because they (and the equivalent parishes in Louisiana and independent cities in a few other states): (1) are the largest units of local government; (2) cover nearly all the territory of the forty-eight contiguous states; and (3) have long been the primary geographic units for the collection of statistics, the maintenance of important records (e.g., births, deaths, marriages, wills,), and the apportionment of representation in both Congress and the state legislatures. It is desirable to compile changes in minor civil divisions, but that would require as much as 30 or 40 times more time, labor, and money; furthermore, the compilation of counties, within whose bounds the smaller units fall, is necessary for any future effort to work at sub-county levels.

Area of Columbia County, Pa.

1813 -- Present

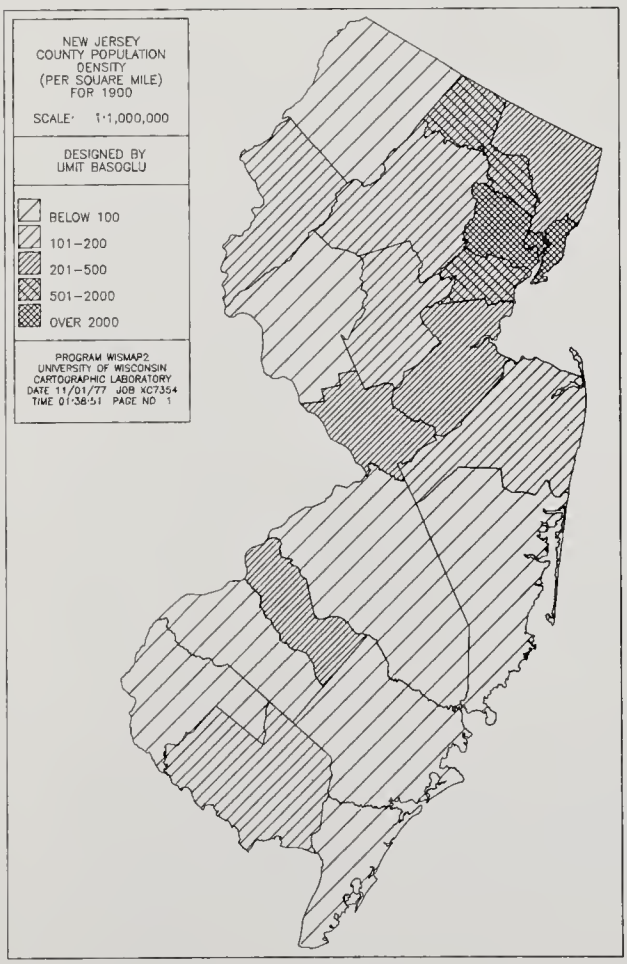
Sep 6, 1813 -- Feb 20, 1815	806 sq. mi.
Feb 21, 1815 -- Apr 30, 1815	757 sq. mi.
May 1, 1815 -- Apr 30, 1816	615 sq. mi.
May 1, 1816 -- Mar 2, 1818	660 sq. mi.
Mar 3, 1818 -- May 2, 1850	627 sq. mi.
May 3, 1850 -- Jan 14, 1853	424 sq. mi.
Jan 15, 1853 -- Present	493 sq. mi.

Areas calculated by computer directly from the Historical Boundary Data File.

THE PRODUCTS

The immediate product of the Historical Boundary project will be a cartographic data base of the historical boundaries, seats of government, and geographic names. Complete copies of the data file produced by the initial project (covering Delaware, Maryland, New Jersey, and Pennsylvania, 1790-1970) will shortly be available in the form of a reel of computer tape from the University of Wisconsin Cartographic Laboratory. Copies will also be deposited with the National Cartographic Information Center (Reston, Va.) and the Inter-University Consortium for Political and Social Research (Ann Arbor, Mich.). Tapes of the file for the Old Northwest will be available in the autumn of 1979.

In addition, there will be two other means of dissemination. First, the University of Wisconsin Cartographic Laboratory will fill individual orders for maps plotted by computer from the Historical Boundary Data File. This service should be valuable not only to individuals but also to libraries and other institutions. For example, at the Newberry the staff has successfully experimented with the construction of a made-to-order reference atlas for each state: a collection of computer-plotted maps that gives complete coverage to all the boundary changes of that state (i.e., one map for each date on which a change occurred). A modern map of the state from the U.S. Geological Survey's 1:1,000,000 scale State Base map series, printed on clear plastic, is included with each of the sets of outline maps. The historical maps were plotted according to specifications that included the scale and projection of the U.S.G.S. 1:1,000,000 state map series, and, as a result, the modern map can be overlaid upon each of the outline maps to compare boundaries past and present and to see which old counties covered today's settlements, rivers, etc.



Map plotted by computer by combining U.S. Census data with Historical Boundary Data File for New Jersey.

Research Associate Stephen Hansen with the first atlas of computer-plotted historical maps (Maryland and Delaware). Photo: Peter Weil

The third means of dissemination will be the publication of a series of state atlases of historical boundaries. In addition to a series of county outline maps of the state (plotted by computer, of course) and sets of maps of individual counties overlaid on a modern base, each atlas will contain instructions for acquiring and using the data file, an exposition of how the file was created, a brief history of the state's boundaries, a bibliography, and a set of chronologies (with references) detailing the historical changes in the boundaries, seats of government, and names. (Each change is dated to the day on which it became legally effective. A series of individual county chronologies will supplement the consolidated, "master" chronology for the state as a whole.) There will also be historical tables of county areas.

Many people will find that an atlas serves all their needs. Every copy of the atlases, however, will be a permanent reminder of, and guide to, the historical boundary data file itself. The chronologies will, in addition, complement the data file by permitting users to select the most appropriate historical dates for the maps they will order from the computer.

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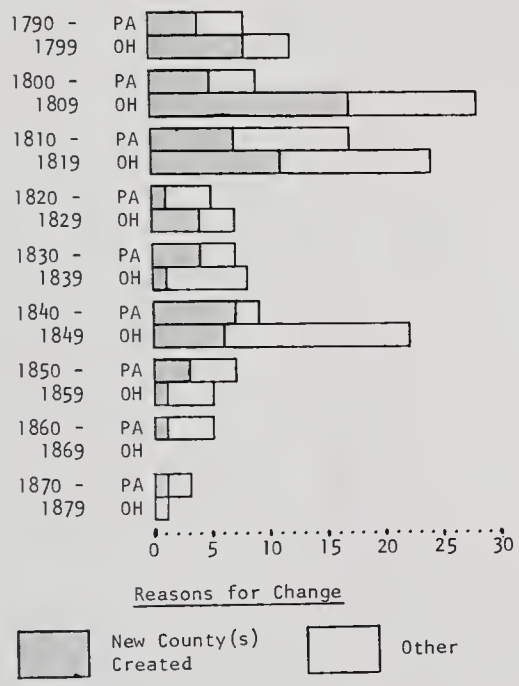

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7/ 4/1851

BALTIMORE CITY
AND COUNTY
LL : 39 229N 765439W
UR : 394311N 761730W

LEGEND

COUNTY SEAT

STATE CAPITOL

5 10

ORGANIZED COUNTY BOUNDARY
ATTACHED UNORGANIZED COUNTY BOUNDARY
ATTACHED NON-COUNTY BOUNDARY
DISPUTED BOUNDARY
JOINT JURISDICTION
ESTIMATED BOUNDARY
COASTLINE

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JUL 4, 1851 **BALTIMORE CITY separated from BALTIMORE, became independent city (county seat of BALTIMORE remained within the city). (Radoff, 101)**

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6/ 1/1888

JAN 5, 1857 **County seat of BALTIMORE moved from Baltimore to Towson. (Radoff, 33)**

JUN 1, 1888 **BALTIMORE CITY annexed part of BALTIMORE. (MD Laws of 1888, Ch. 98)**

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3/29/1918

MAR 29, 1918 **BALTIMORE CITY annexed parts of ANNE ARUNDEL and BALTIMORE. (MD Laws of 1819, Ch. 82)**

These computer-plotted maps give complete coverage to changes in Baltimore City, Md., and show the standard legend built into the data file. Baltimore County is also shown. Text is from the Baltimore City chronology.

ADVANTAGES OF THE COMPUTER

The primary reason for turning to computer cartography was the possibilities it offered for holding down costs. The initial expectations have been fully realized. For example, in terms of the labor, time, and materials required to draft the initial sketch maps of the changing boundaries, use of the computer has made possible savings as great as 97% over more traditional cartographic techniques. This saving is achieved by drawing a single, "master" compilation sheet on which every boundary line ever in effect during the historical time period is drawn but once. Each line segment is then coded and the computer given the supplemental data concerning (1) the county areas separated by the line and (2) the dates of the period when the line was in effect--the computer sorts the lines by date and county when commanded to plot a map. The cost of output is likewise less than would be the case with manual drafting--plotting a set of twenty-two maps of northern New Jersey, complete for the period 1790-1970, cost less than $25, including the operator's wages. For the current project computer cartographic costs are 7% of the total budget; using traditional methods would probably entail budgeting 20% to 30% for cartographic services.

Tight control of errors is another benefit that accrues from the adoption of computer cartography. Because each line is drawn only once the number of chances for error in compilation falls to the minimum. In addition, since each line segment is treated separately, it is possible to correct and up-date the cartographic data file one small bit at a time, a process far more convenient and inexpensive than would be possible otherwise.

Perhaps the most spectacular advantage of employing the computer is the flexibility that it offers. While the compilation proceeds one state at a time and is worked out at the scale of 1:500,000, the maps plotted by the computer may be at any scale and cover any area that the user selects: a single county at 1:500,000 or two or more states at 1:2,000,000, or all the counties along the Delaware River (regardless of state). The possibilities are almost unlimited.

With the aid of existing programs, the computer can calculate the areas of the counties. Furthermore, the historical boundary data file can be linked with a file of historical statistics and the two manipulated by an available mapping program to produce an endless variety of statistical thematic maps. Plotting such maps for different dates will, of course, yield the sort of time series of maps that are otherwise most difficult to make but can be of immense value to analysts and planners, who need to discover past trends in order to predict accurately future developments. Without the computer it would not be possible to offer potential users anything like this number of options.

Project Director John Long with the master compilation sheet for Indiana. Photo: Peter Weil

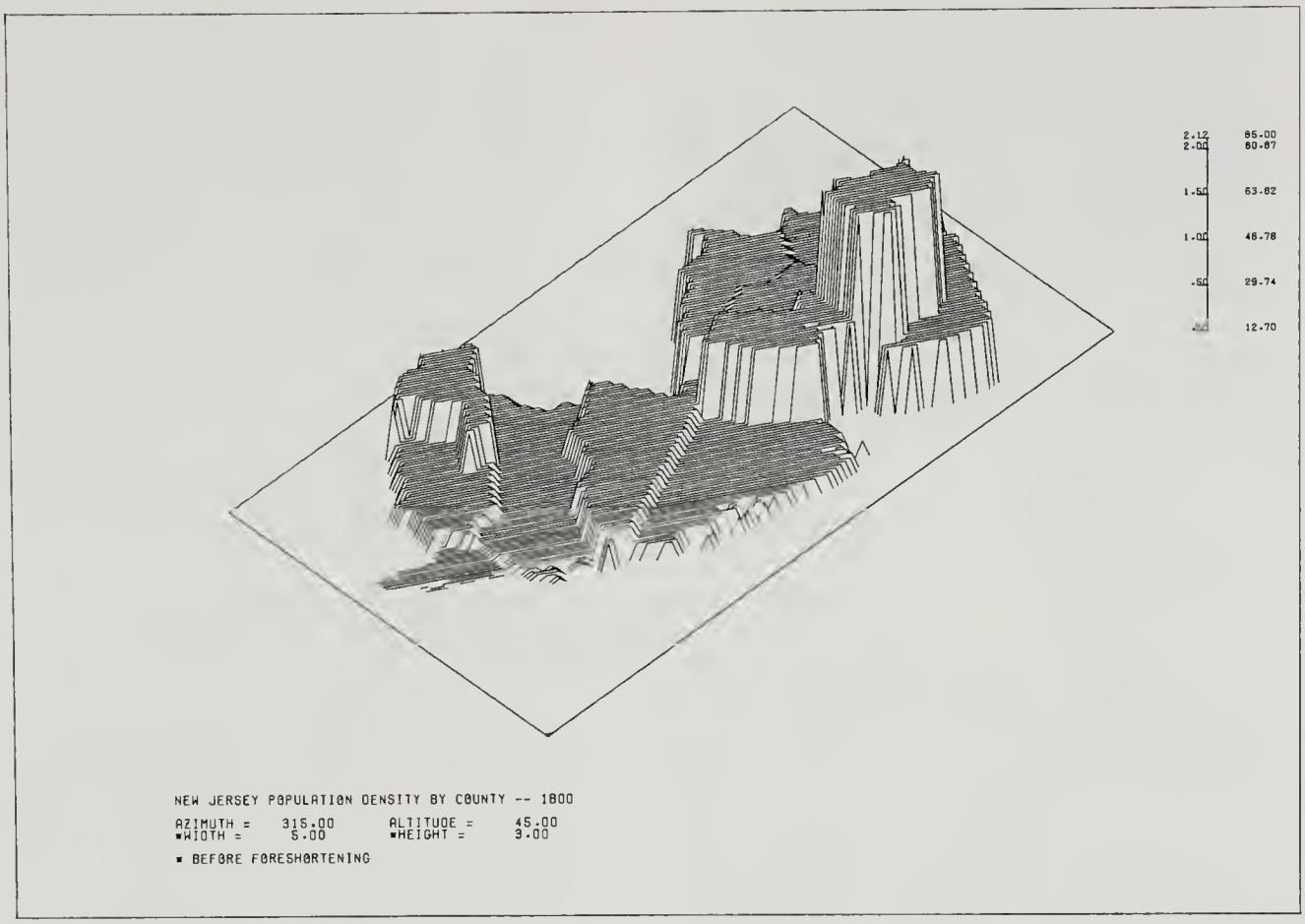
HISTORY OF THE PROJECT

The idea for the Boundary Data File grew out of the experience of the scholars who compiled the Atlas of Early American History (Princeton: Princeton University Press, 1976). They mapped the counties of the Revolutionary era, but were constantly frustrated by the lack of good secondary sources. John Long, then assistant editor of the Atlas, proposed compiling a historical atlas of administrative units in the forty-eight contiguous states.

To be most useful, an atlas of historical administrative units would cover every boundary change at the largest possible scale. It should also be economical and convenient. These requirements, however, created a dilemma that seemed to doom the project: the hundreds of maps required would make the atlas unwieldy, and the redundancy of line work from one map to the next would drive production costs so high that no one could afford to produce it. The solution was provided by David Woodward, Director of the Newberry's Hermon Dunlap Smith Center for the History of Cartography, who pointed out that the cost of map compilation with computer cartography could be as much as 80% less than that of comparable work done with traditional methods of manual drafting and photography. No one had attempted to create a machine-readable cartographic data base that could accommodate historical changes in the data, but in October 1975 the effort to do just that began.

The key to the success of this experiment was the development of a file structure that could efficiently incorporate dates with the usual cartographic data (e.g., lines, areas). This task was accomplished by Umit Basoglu and Joel Morrison of the Cartographic Laboratory of the University of Wisconsin (Madison), subcontractor for cartographic services. Each boundary line in the file is coded and linked with the effective beginning and ending dates of the period during which it separated certain counties and/or had a particular status (e.g., disputed or undisputed). The resulting cartographic data base was compiled at the scale of approximately 8 miles to an inch on 1:500,000 scale base maps from the U.S. Geological Survey's State Base map series, used also in the second phase.

This first phase of the project also produced record keeping systems and compilation techniques that take full advantage of the computer's special strengths and that are used currently.



Map plotted by computer by the University of Wisconsin Cartographic Laboratory using program SYMVU and combining U.S. Census data with the Historical Boundary Data File for New Jersey.

Articles and Papers about the Project

Umit Basoglu and Joel L. Morrison. "An Efficient Hierarchial Data Structure for the U.S. Historical County Boundary Data File," Papers of the 1977 Fall Technical Meeting [of the] American Congress on Surveying and Mapping (Falls Church, Va.: ACSM, 1977), pp. 31-53.

John H. Long, "The Case for Historical Cartographic Data Files," unpublished paper presented at Session 84, American Historical Association--92d Annual Meeting (Dec. 28-30, 1977), Dallas, Texas.

John H. Long, "Research Tool of the Future: Historical Boundary Data Files," unpublished paper presented at Eastern Historical Geography Association--11th Meeting (Sep. 16-17, 1977), Mystic, Conn.

PROJECT STAFF

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